MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2018/2019

TCS2221 – COMPUTER GRAPHICS

(All Sections/Groups)

13 March 2019
02:30PM – 04:30PM
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of 3 pages (including cover page) with 4 structured questions.
2. Answer ALL questions. The distribution of the marks for each question is given.
3. Please write all your answers in the answer booklet provided.

Question 1

(a) A true-color RGB raster system (assume 16 bits per pixel) has a resolution of 1280 by 1024.

i. How many pixels are there in one full screen?
ii. What is the pixel depth of the system?
iii. What is the frame buffer size in KB?
iv. How many distinct colors choices (intensity levels) is available?
v. How long would it takes to load if 10^6 bits can be transferred per second?

[5 marks]

(b) Given a straight line from an endpoint coordinate (2, 1) to coordinate (9, 6), indicate which raster locations would be chosen by the Digital Differential Analyzer Algorithm.

[5 marks]

Question 2

(a) List the four steps to perform texture mapping in OpenGL. [4 marks]

(b) In visible surface detection, when a polygon is considered *invisible*? [4 marks]

(c) Sweep representation is useful for creating 3D objects which have symmetric modelling transformation. Illustrate sweep representation on a torus generated using rotational sweeping.

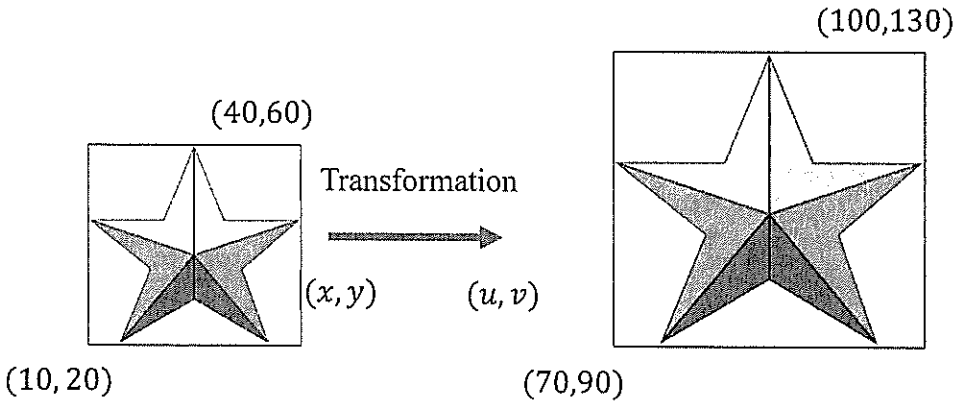
[2 marks]

Continued.....

Question 3

(a) The clipping window selects *what* the user wants to see; the viewport indicates *where* it is to be viewed on the output device. Given the following configurations, determine the Window-to-Viewport transformation.

[4 marks]



(b) List three surface rendering methods and provide the corresponding shading and interpolation methods.

[3 marks]

(c) Three control points of a Bezier curve are P_0 = (2, 3), P_1= (4, 6) and P_2= (5, 7). What are the coordinates on the curve when the ratio is set to $u = 0.2$?

[3 marks]

Question 4

Translate a 2D object to coordinate (6, 8). Then, scales the object 4 times along X-axis and 10 times along Y-axis. Next, rotate the object at 60 degree anti-clockwise about Z-axis.

(a) List the matrices of translation, scaling, and rotation of the above transformations.

[3 marks]

(b) Find the composite matrix ($\mathbf{C}_m$) for the transformation above.

[5 marks]

(c) What is the new coordinate if the same transformation is applied on point Q (80, 5)?

[2 marks]

End of Paper